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मानक

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“The Right to Information, The Right to Live”

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Jawaharlal Nehru

“Step Out From the Old to the New”

IS 6363 (1997): Glossary of terms in work study [MSD 4: Management and Productivity]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
कार्य अध्ययन की पारिभाषिक शब्दावली
(पहला पुनरीक्षण)

Indian Standard
GLOSSARY OF TERMS IN WORK STUDY
(*First Revision*)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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(First Revision)

(Page 21, Figure 3) — Substitute the existing figure with the following figure:

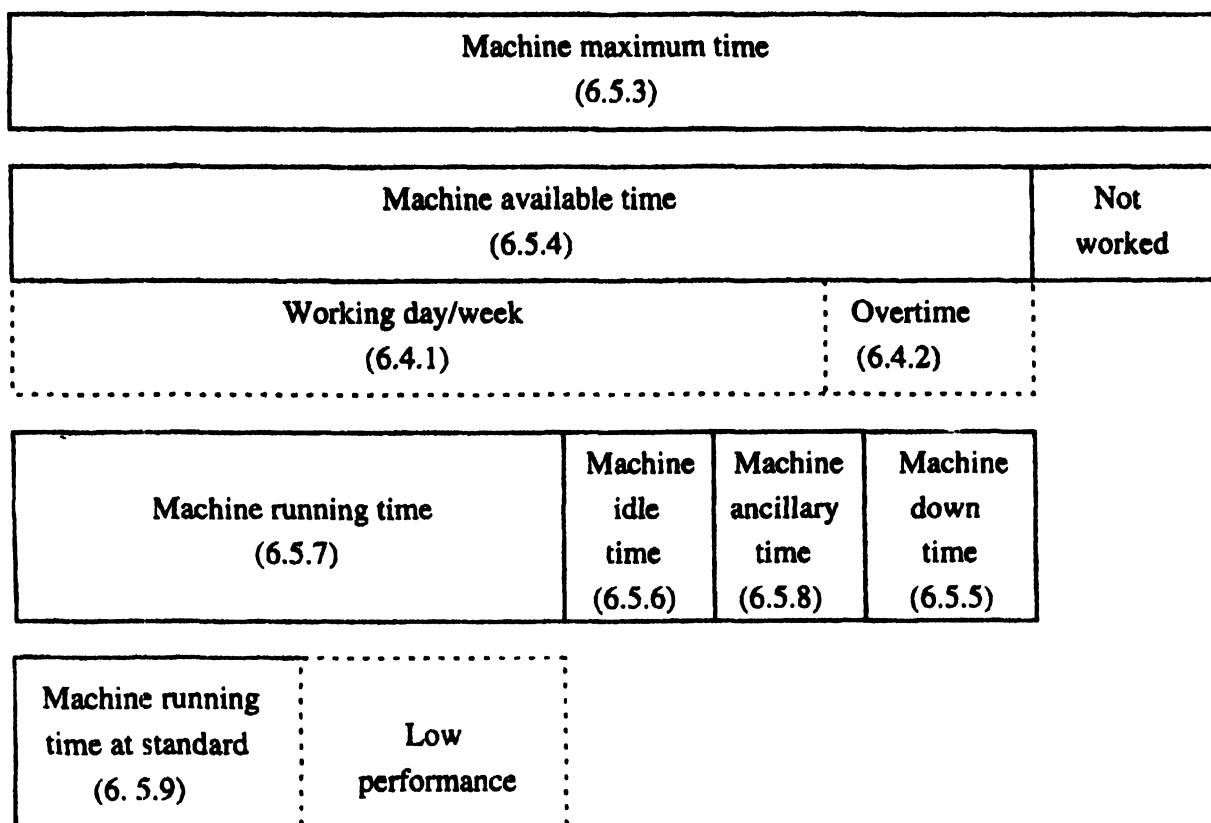


FIG. 3 EXPLANATORY DIAGRAM OF MACHINE TIME

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Management and Productivity Sectional Committee had been approved by the Management and Systems Division Council.

This standard was first published in 1972. This revised version takes into account concepts and practices as prevailing particularly in relation to Critical Examination (CE) (*see 4.4*) and recording symbols of time related activities (*see 4.1.2*).

Work study is a systematic and analytical procedure of studying and evaluating the effectiveness of a work system. It is a scientific procedure used to make improvements to existing or new work situations.

Work study is basically a group technique and hence it is essential to avoid ambiguity of the terms used. Accordingly this standard is intended to define the terms so as to facilitate communication and effective implementation of work study techniques.

Whenever a term defined in the standard has been utilized in the definition of other term, that term has been given in italics. The definition of italicized term can be obtained by referring to the index given at the end of the standard.

The Committee responsible for the formulation of this standard is given at Annex A.

Indian Standard

GLOSSARY OF TERMS IN WORK STUDY

(First Revision)

1 SCOPE

1.1 This standard gives definition of the terms relating to work study.

2 GENERAL TERMS

2.1 Work Study

A generic term for those techniques particularly Method Study and Work Measurement, which are used in the examination of human work in all its contexts, and which lead systematically to the investigation of all the factors which affect the efficiency and economy of the situation being reviewed in order to effect improvement.

2.2 Method Study

A systematic recording and critical examination of existing and proposed ways of doing work, as a means of developing and applying easier and more effective methods and reducing costs.

2.3 Work Measurement

Application of techniques designed to establish the time for a qualified worker to carry out specified job at a defined level of performance.

3 WORK STUDY

3.1 The steps of carrying out work study are

- a) Select the job or process to be studied;
- b) Record from direct observation everything that happens, using most suitable of recording techniques, in order to obtain data in convenient form for analysis;

- c) Examine the recorded facts critically and challenge everything that is done, considering in turn the purpose of the activity; the place where it is performed; the sequence in which the elements are performed; the person who is doing it; the means by which it is done;
- d) Develop the most economic method(s), taking into account all the circumstances;
- e) Measure the amount of work involved in the method used and work out a standard time for doing it;
- f) Define the new method and the time;
- g) Install the new method and time as agreed standard practice; and
- h) Maintain the new standard practice by proper control procedures.

4 TERMS RELATING TO METHOD STUDY

4.1 Recording

4.1.1 Charts Indicating Sequence



4.1.1.1 Process charts

Charts in which a sequence of events is portrayed diagrammatically by means of a set of process chart symbols to help visualize a process for examining and improving it.

4.1.1.2 Process chart symbols

Symbols given below are used for recording the nature of events:

Event	Symbol	Explanation
Operation	○	Indicates the main steps in a process, method or procedure. Usually the part, material or product concerned is modified or changed during the operation
Inspection	□	Indicates an inspection for quality and/or a check for quality
Inspection & Operation	◻	
Delay	D	Indicates a delay in the sequence of events; for example, work or worker waiting between consecutive operations, or any object laid aside

Event	Symbol	Explanation
		temporarily without any other specific activity until required
Transport		Indicate the movement of workers, materials or equipment from place to place
Storage		Indicates a controlled storage in which material is received into or issued from a store under some form of authorization, or an item is retained for reference purposes

4.1.1.3 Outline process chart (OPC)

This is used to give an overview of the principle operations and inspections to indicate if more detailed studies are required. The chart records the main activities namely,

- — Operation
- — Inspection

4.1.1.4 Flow process chart (FPC)

This chart is used to depict the sequence of activities of worker or processing of materials/documents or use of equipment or combination of few or all. All activities by man, or on material or equipment or document are recorded by five process chart symbols (*see* 4.1.1.2):

- a) *Flow Process Chart (man type)* — A flow process chart which records what the worker does.
- b) *Flow Process Chart (material type)* — A flow process chart which records how material is handled or treated.
- c) *Flow Process Chart (equipment type)* — A flow process chart which records how the equipment is used.
- d) *Flow Process Chart (combined type)* — A flow process chart which records sequence of activities of worker, material and equipment and their inter-dependence.




4.1.1.5 OTIS chart

An OTIS chart is a flow process chart recorded on a form which is preprinted with columns containing

the process chart symbols for operation, transport, inspection and storage (hence *OTIS*). Symbols are simply connected by drawing lines from one to another indicating the sequence of activities.






4.1.1.6 Two handed process chart (2 HPC)





A process chart in which the activities of a worker's hands or limbs are recorded in their relationship to one another. The same symbols are used with slightly different connotation :

- Operation is used for the activities of grasp, position, use, release etc, of a tool, component, or material.
- Inspection for quality and/or a check for quantity.
-  Transport is used to represent the movement of hand (or limb) to or from the work or a tool or a material.
-  Delay is used to denote time during which the hand or limb being charted is idle (although the others may be in use).
-  Hold is the term used instead of the term storage and is used to represent the activity of holding the work tool or material.

4.1.1.7 Symbols used in work study relating to paper work and documentation

In addition to the symbols included in 4.1.1.2 the following symbols are used in work study relating to paper work and documentation:

Event	Symbol	Explanation
Origin of form		Form first being made out
Origin of form		Form first being made out in duplicate
Origin of form		Form first being made out in triplicate, etc.
File		Form in a file
Information take-off		Information being taken off the form for entry into another or for use by someone. Point of line indicates symbol on other parallel chart where information is going. (Use ----- broken line to indicate the destina-






Event	Symbol	Explanation
Disposal		Form or copy destroyed
Inspection		Correctness of information on the form checked by comparison with other sources of information. (Use ----- broken line drawn to the other source if other source appears on the chart and the line is an aid to clarity).
Item change		Change in the item charted.
Gap		Activities not pertinent to the study and hence not charted in detail.

4.1.2 Charts Using Time Scale

4.1.2.1 Multiple activity chart (MAC)

The multiple activity chart reflects activities of men and/or machines on a common time scale to show their inter-relationship. By using the number of columns to represent the activities, the chart shows

clearly periods of idleness on the part of any of the subjects during the process. A study of these charts makes it possible to reschedule these activities so that ineffective time is reduced. The chart can be used to determine the number of machines which the operator(s) should be able to look after.
Symbols used for MAC

Event	Symbol	Explanation
Operation		Indicates the main steps in a process, method or procedure. Usually the part, material or product concerned is modified or changed during the operation.
Inspection		Indicates an inspection for quality and/or a check for quantity
Delay		Indicates a delay in the sequence of events; for example, work or workers waiting between consecutive operations, or any object laid aside temporarily without record until required.
Storage		Indicates a controlled storage in which material is received into or issued from a store under some form of authorization, or an item is retained for reference purpose.
Transport		Indicates the movement of workers, materials or equipment from place to place.

4.1.3 Diagrams Indicating Movement

4.1.3.1 Flow diagram

A diagram or model substantially to scale, which shows the location of specific activities and the paths of movement of men, materials or equipment. These are prepared by putting the symbols of the flow process chart on a plan, each symbol being located where the activity takes place. The arrow heads of the transport symbol shows the direction of movement while the length of the line joining other activity symbols indicates distance moved.

4.1.3.2 String diagram

A scale plan or model on which a thread is used to trace and measure the path of workers, material or equipment during specified sequence of event. It is very useful to examine work situations involving frequent movements. Before a study is carried out, an identification code is used to define each work, obstruction and change in direction.

4.1.3.3 Travel chart

A tabular record for presenting quantitative chart provides a method for identifying, displaying and

evaluating the many relationships which need to be taken into account, to ensure that the various functions and services are physically located in the best possible relationship to each other.

4.1.3.4 Filming techniques

A form of time-lapse photography which records activity by the use of a cine camera adapted to take pictures at longer intervals than normal. The time intervals usually are between half second and four seconds.

Some of these techniques are given below :

- a) *Simo chart* — It is complementary technique to two handed process chart. The simo chart is based on film analysis used to record simultaneously the activities of hands, legs and other body movements of one or more workers, on a time scale using therbligs. A video film technique may also be used.
- i) *Therblig* is the name given by Frank B. Gilberth to each of the specific divisions of movement, according to the purpose for which it is made. These therbligs cover movements or reasons for the absence of movement. Each therblig has a specific colour symbol and letter for recording purposes (see Table 1).

Table 1 List of Therbligs

Symbol	Name	Colour
○	Search	Black
◉	Find	Grey
→	Select	Light grey
∩	Grasp	Red
⌒	Hold	Gold ochre
↪	Transport load	Green
9	Position	Blue
#	Assemble	Violet
U	Use	Purple
≠	Disassemble	Light violet
0	Inspect	Burnt ochre
8	Pre-position	Pale blue
↩	Release load	Oarmino red
↶	Transport empty	Olive green
ℓ	Rest for overcoming fatigue	Orange
∧	Unavoidable delay	Yellow
⌒	Avoidable delay	Lemon yellow
℘	Plan	Brown

- b) *Cycle graph* — A record of movement traced by continuous source of light attached to a moving element on a still photograph. This technique is particularly useful for high speed short cycle operations and is used to improve the work station layouts for bench type assembly work.
- c) *Chronocycle graph* — A cycle graph in which the light source is suitably interrupted so that the path appears as a series of pear-shaped dots, the pointed end indicating the direction of movement and spacing indicating the speed of movement.
- d) *Micromotion photography* — A record of detailed movement of a single operator on a cine film or video tape. By this means, the distinct movement of the operator and their sequence are identified and duration is measured.
- e) *Memomotion photography* — This photography is a variation of micromotion in which single frames are exposed at regular time intervals. This provides a short record of events. Analysis of the film provides information about the activities which have taken place, their sequence and duration.
- f) *Film analysis* — The frame-by-frame examination of a cine film of an operation to determine the state of activity of the subject during each exposure to prepare an appropriate chart or record.
- g) *Frame counter* — A projector accessory by means of which the number of frames run through our projector during a *film analysis* can be read whenever required.
- h) *Wink* — A term used to denote 1/2 000 minutes.
- j) *Wink counter* — A timing device, graduated in *winks*, placed in the field of the camera during the filming of an operation and easily visible.

4.2 Motion Economy

4.2.1 Work Place Layout

A convenient term used to describe the space and the arrangement of facilities and conditions provided for a worker in the performance of a specified job.

- a) *Normal working area* — The space within which a seated or standing worker can reach and use tools, materials and equipment when his elbows fall naturally by the side of the body.
- b) *Maximum working area* — The space over which a seated or standing worker has to make full length arm movements (that is,

from the shoulder) in order to reach and use tools, materials and equipment.

- c) *Immediate working area* — This is the surface immediately in front of the operator where the two arcs of the normal working area overlap.

NOTE — Similar is the analogy when legs are used.

4.2.2 Principles of Motion Economy

4.2.2.1 Characteristics of easy movement (principles of motion economy)

Characteristics which, when incorporated in the methods adopted, make for easier working:

- a) *Minimum movements* — Movements which, while natural, are the minimum necessary for the job.
- b) *Simultaneous movements* — Movements in which different limbs are working at the same time.
- c) *Symmetrical movements* — Movements which are so arranged that they can be performed on the right and left sides of the body symmetrically about an imaginary plane through the centre of the body.
- d) *Natural movements* — Movements which make the best use of the shape and arrangement of the part of the body involved.
- e) *Rhythmical movements* — A sequence of movements which induces a natural rhythm when repeated.
- f) *Habitual movements* — Movements designed, through precise repetition, to become a habit.
- g) *Continuous movements* — Movements which are smooth and curved and which avoid sharp changes of direction and of speed.

4.3 Motion Study

The analysis of movements of the human body at work for the purpose of eliminating wasteful

motions, reducing fatigue and ensuring better coordination of efforts.

NOTE — While the recording techniques of method study will enable collection of facts pertaining to a work situation, it may be necessary to take the help of other management principles to collect/supplement more facts/information. The data so collected is now available for critical examination with a view to find better, simpler and more effective ways of doing things.

4.4 Critical Examination (CE)

It is a disciplined questioning technique which leads to alternative ways of doing the work, culminating in the selection for development of the most efficient, economical and practical way in which the job can be done. It is the operative step in method study which leads to improvements.

4.4.1 'Make Ready' Activities

The activities required to prepare material or work piece and set it in position ready to be worked upon.

4.4.2 'Do' Operations

The activities in which a change is made in shape, chemical composition or physical condition of the product.

4.4.3 'Put Away' Activities

The activities during which the work is moved aside from the machine or work place. The put away activities of one operation may be the make ready activities of the next operation.

NOTE — Identification of the activities to the work situation under study, in the above categories, will enable establishing priorities to conduct critical examination.

4.4.4 Primary Questions

The questions asked to gather basic information with a view to improve the method. The primary questions thereof are:

PURPOSE :	What Why	is actually done? is the activity necessary at all	ELIMINATE unnecessary parts of the job.
MEANS :	How	is it being done? Why is it being done in that particular way.	SIMPLIFY the operation.
SEQUENCE :	When	is it done? Why is it done at that particular time ?	COMBINE wherever possible or

PLACE	:	Where	is it being done? Why is it done at that particular place?	REARRANGE the sequence of operations for more effective results
PERSON	:	Who	is doing it ? Why is it done by that particular person ?	

4.4.5 Secondary Questions

The secondary questions cover the second stage of the questioning technique, during which the answers to the primary questions are subjected to further query to determine whether possible alternatives of place, sequence, persons and/or means are practicable as a means of improvement upon the existing method.

4.4.6 Combining two primary questions and two secondary questions completes the questioning technique.

PURPOSE	:	What is done ? Why is it done ? What else might be done ? What should be done ?
MEANS	:	How is it done ? Why is it done that way ? How else might it be done ? How should it be done ?
SEQUENCE	:	When is it done ? Why is it done then ? When might it be done ? When should it be done ?
PLACE	:	Where is it done ? Why is it done there ? Where else might it be done ? Where should it be done ?
PERSON	:	Who does it ? Why does that person do it ? Who else might do it ? Who should do it ?

These questions, in the above sequence, must be asked systematically every time a method study is undertaken. They are the basis of successful method study.

5 TERMS RELATING TO WORK MEASUREMENT

5.1 Techniques

5.1.1 Time Study

A technique for recording the times and rates of working for the *elements* of a specified *job* carried out under specified conditions, and for analyzing

the data so as to determine the time necessary for carrying out the *job* at a standard level of performance.

5.1.2 Synthesis

A technique for building up the time for a *job* or parts of a *job* at a defined level of performance by totalling *element* times obtained previously from *time studies* on other *jobs* containing the *elements* concerned, or from *synthetic data*.

5.1.3 Predetermined Motion Time System (PMTS)

A technique whereby times established for basic human motions (classified according to the nature of the motion and the conditions under which it is made) are used to build up the time for a *job* at a defined level performance.

NOTE — The breakdown forms a useful basis for analysis with a view to method improvement.

5.1.4 Estimating

A means for assessing the time required to carry out work, based on knowledge and experience of similar types of work, without a detailed breakdown of the work into *elements*, and their corresponding times at a defined level of performance.

5.1.5 Analytical Estimating

A technique which enables development of *estimation*, whereby the time required to carry out *element* of a *job* at a defined level of performance is estimated partly from knowledge and practical experience of the *elements* concerned and partly from *synthetic data* and or actual time study data.

5.1.6 Comparative Estimating

A technique in which the time for a *job* is evaluated by comparing the work in it with the work in a series of similar *jobs* — benchmarks — the work content of which has been measured. The arrangement of *jobs* into broad bands of time is referred to as 'slotting'.

5.1.7 Time Ladder

This technique may be used by asking office staff to maintain a record (log) of the details of the activities at a regular time interval throughout and for a sufficiently long period along with output of each activity. This gives the time estimates for each activity. This technique can be used for setting official standards.

5.1.8 Activity Sampling (*Ratio-Delay Study, Observation Ratio Study, Snap-Reading Method, Random Observation Method, Work Sampling*)

A technique in which a large number of observations are made over a period of time of one or a group of machines, processes or workers. Each observation records what is happening at that instant and the percentage of observations recorded for a particular activity or delay is regarded as a measure of the percentage of time during which that activity or delay occurs.

5.1.9 Rated Activity Sampling (*Snap-Study Method*)

An extension of *activity sampling* in which *rating* is applied so that, where the frequency is known, *work content* may be established in addition to the proportion of time occupied by other activities or delays.

5.1.10 Production Study (*Overall Study*)

A continuous study of relatively lengthy duration, often extending over a period of one or more shifts, taken with the object of checking an existing or proposed *standard time*, or obtaining other information affecting the rate of output.

5.1.11 Synthetic Data (*Standard Data*)

Tables and formulae derived from the analysis of accumulated *work measurement* data, arranged in a form suitable for *building up standard time, machine process times*, etc, by *synthesis*.

5.2 Element Breakdown

5.2.1 Element

A distinct part of a specified *job* selected for convenience of observation, measurement and analysis.

5.2.2 Job Breakdown

Listing of the content of a *job* by *elements*.

5.2.3 Work Cycle

The sequence of *elements* which are required to perform a *job* or to yield a unit of production, the sequence may sometimes include *occasional elements*.

5.2.4 Break Point

The instant at which one *element* in a *work cycle* ends and another begins.

5.2.5 Repetitive Element (*Cycle Element*)

An *element* which occurs in every *work cycle* of a *job*.

5.2.6 Occasional Element (*Intermittent Element*)

An *element* which does not occur in every *work cycle* of a *job* but which may occur at regular or irregular intervals.

5.2.7 Constant Element

An *element* for which the *basic time* remains constant whenever it is performed.

5.2.8 Variable Element

An *element* for which the *basic time* varies in relation to some characteristics of the product, equipment or process, for example, dimensions, weight and quality.

5.2.9 Manual Element

An *element* performed by a worker.

5.2.10 Machine Element

An *element* automatically performed by a power driven machine (or process).

5.2.11 Governing Element

An *element* occupying a longer time than that of any other *element* which is being performed concurrently.

5.2.12 Extraneous Element

An *element* observed during a study which, after analysis, is not found to be necessary part of the *job*.

5.3 Time and Work Classification

5.3.1 Timing

The practice of observing and recording by the use of a watch or other device, the time taken to complete each *element*. Four alternative methods of timing with a stop-watch are:

- a) *Flyback timing (snapback timing)* — A method in which the hands of the stop-watch are returned to zero at the end of each *element* and are allowed to restart immediately, that is, at the beginning of the next *element* and the time for the *element* being obtained directly.
- b) *Cumulative timing (continuous timing)* — A method in which the hands of the stop-watch are allowed to continue to move without returning them to zero at the end of each *element*, the time for each *element* being obtained subsequently by subtraction.
- c) *Differential timing* — A method for obtaining the time of one or more small *elements*. *Elements* are timed in groups, first including and then excluding each small *element*, the time for each *element* being obtained subsequently by subtraction.
- d) *Selective timing* — A method for obtaining the time of an *element* in which the hands of the stop-watch are stopped at the end of the selected *element* without returning them to zero, and allowed to continue to move when

the *element* recurs. The time for the *element* is subsequently obtained by dividing the total accumulated time by the number of occurrences.

5.3.2 Time On

The time at which an observation of *time study* for a particular operation is started.

5.3.3 Time Off

The time at which the particular observation is concluded.

5.3.4 Observed Time

The time taken to perform an *element* or combination of *elements* obtained by means of direct measurement.

5.3.5 Subtracted Time

The time taken to perform an *element* or combination of *elements*, obtained by subtracting the time recorded at one *break point* from that recorded at subsequent *break point*, using the *cumulative* or *differential timing* method.

5.3.6 Cycle Time

The total time taken to complete the *elements* constituting the *work cycle*.

5.3.7 Elapsed Time

The total time from the start to the finish of a *time study*.

5.3.8 Check Time

The time intervals between the start of a *time study* and the start of the first *element* observed (known as T.E.B.S. or time elapsed before starting), and between the finish of the last *element* observed and finish the study (known as T.E.A.F. or time elapsed after finishing).

5.3.9 Unaccounted Time

The difference between the *elapsed time* and the sum of the separate *times*, including *check time*, recorded during a *time study*.

5.3.10 Effective Time

That portion of the elapsed time, excluding the check time, during which the worker is engaged in the proper performance of a prescribed job.

5.3.11 Ineffective Time

That portion of the *elapsed time*, excluding the *check time*, spent on any activity which is not a specified part of a job.

5.3.12 Start-Up Time (Preparation Time)

Time taken by any work and any enforced *waiting time* which necessarily occurs at the start of a shift or work period before production can begin.

5.3.13 Shut-Down Time

The time taken by any work and any enforced *waiting time* which necessarily occurs at the end of a shift or work period after production has ceased.

5.3.14 Set-Up Time (Make-Ready Time)

The time required for preparing a machine (or process) for production.

5.3.15 Dismantling Time (Tear-Down Time)

The time for dismantling an existing setup after completing production.

5.3.16 Changeover Time

The time required by a worker for necessary activities or *waiting time*, at the start and/or end of a job or batch. These time should be denoted as:

- a) job changeover time, and
- b) batch changeover time.

5.3.17 Patrol Time

The time during which a worker operating a number of machines (or processes) is walking between them and at the same time exercising attention to ensure satisfactory operation.

5.3.18 Attention Time

The time during which the presence of a worker is necessary to ensure the proper functioning of a machine (or process) although the worker is not carrying out physical work.

5.3.19 Unoccupied Time (Unoccupied Cycle Time)

The periods during *machine* (or *process*) *controlled time* when a worker is neither engaged on *inside work* nor in taking authorized rest, the time for carrying out the inside work being calculated at a defined performance (usually *standard performance*) (see Fig. 2). Similar circumstances arise in *team work*, where the availability of work to some workers is dependent on other members of the team.

5.3.20 Waiting Time

The part of *attendance time*, other than *unoccupied time*, during which the worker is available but is prevented from working. Waiting time may be analyzed under the headings Department Responsible (DR) and Department Not Responsible (DNR) (see Fig. 2).

5.3.21 Idle Time

That part of *attendance time* when the worker has work available but does not do it.

5.3.22 Interference Time (Synchronization Time)

That part of productive time which is lost due to the simultaneous requirements for service of two or more operations, machines or processes, creating a demand which is greater than the planned amount of service can supply. The majority of cases of its occurrence are where the incidence of demand for service is of a random nature.

5.3.23 Machine Down Time

The time during which a machine cannot be operated on production or *ancillary work* owing to breakdown, maintenance requirements, or for other similar reasons. In some cases, for example, preventive maintenance schemes, machine down time may form part of the time when the machine is 'not worked' (see Fig. 3).

5.3.24 Machine Idle Time

The time during which a machine is available for production or *ancillary work* but is not used owing to shortage of work, materials or workers, including the time that the plant is out of balance. In some cases of known shortage of work or material this idle time may be considered as part of the time when the machine is 'not worked' (see Fig. 3).

5.3.25 Machine Running Time

The time during which a machine is actually operating, that is, the *machine available time* less any *machine down time*, *machine idle time* and *machine ancillary time* (see Fig. 3).

5.3.26 Governing Time

The *element time* or *cycle time* controlling the output of one or more workers or machine (or processes).

5.3.27 Machine-Controlled Time (Process-Controlled Time)

The time taken to complete that part of the *work cycle* which is determined only by technical factors peculiar to the machine (or process).

5.3.28 Reference Period

A period selected as being representative of conditions before implementing changes and used as a datum against which to compare subsequent results.

5.3.29 Travelling Time

The time required for a worker to travel between the place at which he reports for duty and his place of work. This may also include the time taken for travelling from one place of work to another place of work when a worker is expected to work at more than one place.

5.3.30 Restricted Work

Work in which the output of the worker is limited by factors outside the control of the worker (see Fig. 2).

5.3.31 Unrestricted Work (Free Work)

Work in which the output of the worker is limited only by factors within the control of the worker (see Fig. 2).

5.3.32 Inside Work (Inside Cycle Work, Auxiliary Work, Internal Work)

Elements which can be performed by a worker within the *machine* (or *process*) *controlled time* (see Fig. 2).

5.3.33 Outside Work (Outside Cycle Work, Principal Work, External Work)

Elements which must necessarily be performed by a worker outside the *machine* (or *process*) *controlled time* (see Fig. 2).

5.3.34 Load Factor [Extent Occupied (EO), Normal Working Time (NWT), Work Load]

The proportion of the overall *cycle time* required by the worker to carry out the necessary work at *standard performance*, during a *machine* (or *process*) *controlled cycle*.

5.3.35 Work Opportunity

The number of *units of work* that are potentially available to a worker per unit of time (usually an hour) limited only by factors outside the control of the worker.

5.3.36 Team Work

Work done by a number of workers in close association, each worker contributing towards a completed unit of production. Individual *work opportunities* depend on *work balancing* and collective output of the team.

NOTE — When used in the context of Human Resource Development (HRD), 'Team Work' means a concerted group effort for achieving organizational goal collectively utilizing individual's knowledge, skill, competence and potential.

5.3.37 Work Balancing

The procedure used to ensure that the amounts of work assigned to individual workers in *team work* (for example, an assembly line) are as nearly equal as possible.

5.3.38 Reject Frequency (Breakage Frequency)

The frequency with which the good production of a machine (or process) is interrupted because of inconsistencies in the process or the material.

5.3.39 Multiple Machine Work

Work which requires the worker to attend two or more machines (of similar or different kinds) running simultaneously.

5.3.40 Machine Interference

The queuing of machine (or processes) for attention, for example, when one worker is responsible for attending to more than one machine.

NOTE: — Similar circumstances arise in team work where random delays at any point may affect the output of the team.

5.4 Performance and Rating

5.4.1 Standard Performance

The rate of output which *qualified workers* will naturally achieve without over-exertion as an average over the working day or shift provided they adhere to the specified method and are motivated to apply themselves to their work (it is recommended that this be denoted by 100 on the standard scale, corresponding to the performance of 1 *Standard Hour* of work per hour or 60 *Standard Minutes* of work per 60 minutes) (see also 5.5.15).

5.4.2 Speed of Movement

The pace or tempo of the worker's actions.

5.4.3 Concentration

Intensity of attention.

5.4.4 Consistency

The ability to adhere regularly to the same motion pattern and *speeds of movements* for a given *element* or sequence of *elements*.

5.4.5 Dexterity

The manipulative ability achieved through good motor and perceptual coordination.

5.4.6 Effort

The physical and/or mental exertion expended by the worker.

5.4.7 Skill

The proficiency, innate or acquired, which enables a worker to perform a *job* effectively.

5.4.8 Learning Curve

A graphical representation of the rate at which the *cycle time* decreases or is expected to decrease with increasing experience.

5.4.9 Levelling

A method used to *rate* whereby a 'Levelling factor' is determined by reference to a table of point values for various grades of *skill* and *effort* (and sometimes

also conditions and *consistency*). The algebraic sum of the point values assigned to each factor is used in adjusting the observed time to give the time required at a stated performance level.

5.4.10 Qualified Worker

One who is accepted as having the necessary physical attributes, who possesses the required intelligence and education, and has acquired the necessary *skill* and knowledge to carry out the work in hand to satisfactory standards of safety, quantity and quality.

5.4.11 Representative Worker

A worker whose *skill* and performance is the average of a group under consideration. The group need not be a skilled or qualified group.

5.4.12 Rating

To assess the worker's rate of working relative to the observer's concept of the rate corresponding to *standard rating*. The observer may take into account, separately or in combination, one or more factors necessary for carrying out of the *job*, such as *speed of movement*, *effort*, *dexterity*, *consistency* and adherence to specified methods.

A numerical value or symbol is used to denote the rate of working on the rating scale. The rating can be classified as under :

- a) *Loose rating* — An inaccurate *rating* which is too high.
- b) *Tight rating* — An inaccurate *rating* which is too low.
- c) *Inconsistent rating* — A mixture of *loose*, *tight* and accurate *ratings*.
- d) *Flat ratings* — A set of *ratings* in which the observer has underestimated the variations in the worker's rate of working.
- e) *Steep ratings* — A set of *ratings* in which the observer has overestimated the variations in the worker's rate of working.

5.4.13 Rating Scale

The series of numerical indices given to various rates of working. The scale is linear. The three most commonly used scales start at zero and take 80, 100, 133 respectively as the numerical values of *Standard Rating*. Further it is recommended that *rating* be denoted in steps of 5.

5.4.14 Standard Rating and Performance Scale

0/100, where 0 corresponds to no activity and 100 corresponds to 80 or 133 on the other common scales.

5.4.15 Standard Rating

The *rating* corresponding to the average rate at which *qualified workers* will naturally work at a *job*,

provided they adhere to the specified method and are motivated to apply themselves to their work. If the *standard rating* is maintained and the appropriate relaxation is taken, a worker will achieve *standard performance* over the working day or shift.

5.5 Calculation of Standard Time

5.5.1 Basic Time (Extended Time, Converted Time, Standardized Time)

The time for carrying out an *element* of work at *standard rating*, that is

$$\frac{\text{Observed time} \times \text{Observed rating}}{\text{Standard rating}}$$

5.5.2 Extension (Normalizing Conversion, Standardizing)

The calculation of *basic time* from *observed time*.

5.5.3 Selected Time

The time chosen as being representative of a group of times for an *element* or combination of *elements*. These times may be either *observed* or *basic* and should be denoted as selected observed or selected basic times.

5.5.4 Relaxation Allowance (R.A.) (Compensating Rest Allowance)

An addition to the *basic time* intended to provide the worker with the opportunity to recover from the physiological and psychological effects of carrying out specified work under specified conditions and to allow attention to personal needs. The amount of the allowance will depend on the nature of the *job*. This comprises *fatigue allowance*, *personal needs allowance* and other *contingency allowances*.

5.5.5 Fatigue Allowance

A sub-division of the *relaxation allowance* intended to cater for the physiological and psychological effects of carrying out specified work under specified conditions.

5.5.6 Personal Needs Allowance

A subdivision of the *relaxation allowance* intended to cater for attention to personal needs.

5.5.7 Contingency Allowance

A small allowance of time which may be included in a *standard time* to meet legitimate and expected items of work or delays, the precise measurement of which may be uneconomical because of their infrequent or irregular occurrence.

5.5.7.1 Work contingency allowance

A subdivision of *contingency allowance* intended to cater for legitimate and expected items of work (for

example, occasional inspection or gauging, process rejects, rectification and tool adjustments).

5.5.7.2 Delay contingency allowance

A subdivision of *contingency allowance* intended to cater for legitimate and expected delays (for example, machine delays and telephone interruptions).

5.5.8 Policy Allowance

An *increment* other than *bonus increment*, applied to *standard time* (or some constituent part of it, such as *work content*) to provide a satisfactory level of earnings for a specified level of performance under exceptional circumstances.

5.5.9 Learner Allowance

A temporary benefit given to workers while they develop ability.

5.5.10 Changeover Allowance

An allowance to compensate workers for time spent on necessary activities or *waiting time*, at the start and/or end of a *job* or batch. These allowances should be denoted as:

- a) job changeover allowance, and
- b) batch changeover allowance.

5.5.11 Unoccupied Time Allowance (Process Allowance)

An allowance made to a worker when there is *unoccupied time* during *machine* (or *process*) *controlled time*. This may apply to *team work*.

5.5.12 Excess Work Allowance (Extra Time Allowance)

An addition to *standard time* given for extra work occasioned by a temporary departure from standard conditions.

5.5.13 Interference Allowance (Synchronization Allowance)

An allowance of time for production unavoidably lost through *interference time*.

5.5.14 Bonus Increment

An addition, other than *policy allowance*, to *standard time* (or some constituent part of it, such as *work content*) as a basis for an incentive scheme.

5.5.15 Standard Unit of Work (Standard Hour, Standard Minute)

A unit of work consists partly of work and partly of *relaxation*, the proportion of *relaxation* to work varying with the nature of the *job*. In current practice the unit has a value such that 100, 80, 60 or 1 are produced in one hour when *unrestricted work* is

carried out at *standard performance*, that is, at 100 *standard* scale. [It is recommended that the basis with 1 or 60 units per hour be adopted in future and that these units be termed *standard hours* (SHs) or *standard minutes* (SMs) respectively.]

5.5.16 Work Content (Basic Time + Relaxation Allowance + Any Other Allowance for Additional Work, for example, Work Contingency Allowance)

Where it is required to indicate *basic time plus relaxation allowance* only the term *work content* (basic) should be used, expressed in *standard units of work*.

5.5.17 Standard Time

The total time in which a *job* should be completed at *standard performance*, that is, *work content* (total), *delay contingency allowance*, *unoccupied time* and *interference time*, where applicable (see Fig. 1).

5.5.18 Allowed Time

A time issued for payment purposes, where the *standard time* (or some constituent part of it, such as *work content*) is increased by the appropriate application of a *bonus increment* and/or *policy allowance* (see Fig. 1).

5.5.19 Check Study (Proof Study)

A *time study* of relatively short duration taken with the object of confirming an existing or proposed *standard time*.

5.5.20 Work Specification

A document setting out the details of an operation or *job* how it is to be performed, the layout of the workplace, particulars of machines, tools and appliances to be used, and the duties and responsibilities of the worker. The *standard time* or *allowed time* assigned to the *job* is normally included.

5.5.21 Loose Time Value (Loose Rate, Loose Value, Loose Standard, Loose Work Value)

A time set for a *job*, such that the operator, when working at *standard rating* and taking the appropriate relaxation, is credited with more than *standard performance*.

5.5.22 Tight Time Value (Tight Rate, Tight Value, Tight Standard, Tight Work Value)

A time set for a *job*, such that the operator, when working at *standard rating* and taking the appropriate relaxation, is credited with less than *standard performance*.

6 TERMS RELATING TO SPECIALIZED FIELDS CLOSELY ASSOCIATED WITH WORK STUDY

6.1 Job Evaluation

6.1.1 Job Evaluation

Determination of the relative worth of jobs.

6.1.2 Job

All the work carried out by a worker or a group of workers in the completion of their prescribed duties and grouped together under one title or definition. In *work study* techniques it may also denote a part of these duties.

6.1.3 Job Ranking Method

A method of *job evaluation* which determines the relative position of each *job* by comparison with all other *jobs*. It does not indicate the extent of the difference between *jobs* at different levels.

6.1.4 Job Classification Method

A development of the *job ranking method* in which *jobs* are arranged in previously determined *job* grades and/or wage levels.

6.1.5 Factor Comparison Method

The definition and assessment of *jobs* in terms of a few common factors. Key *jobs*, the wages of which are considered to be equitably related to one another, are analyzed in terms of these *job factors* and the cash value of each factor is determined by comparing the factor requirements with those of the key *jobs* for which the money value of each factor is determined.

6.1.6 Points Rating Method

The method of numerically evaluating *jobs* by the detailed analysis of component *job factors*. Each factor is defined precisely and is given a range of points values so that every *job* can be assessed numerically within the established range.

6.1.7 Job Description

A statement of the content and requirement of a *job*.

6.1.8 Job Analysis

The assessment of the requirements of a *job* in terms of its *job factors*.

NOTE — In the context of Human Resource Development (HRD), 'Job Analysis' means the process of determining and recording pertinent information relating to the nature of a specific job.

6.1.9 Job Factor

A requirement of the *job* that can be recognized, defined and assessed (for example, mental and

physical demands, *skill* required, responsibility and working conditions).

6.1.10 Degree of Factor

A numerical value assigned to a defined level of a factor, for example:

Experience: Degree 1 = up to 1 month
 Degree 2 = over 1 month and up to 4 months
 Degree 3 = over 4 months and up to 1 year

6.1.11 Job Assessment

The process of ascertaining the relative value of a *job* by examination of the *job analysis* and *job description*.

6.1.12 Job Grading

The grouping of *jobs* with similar contents/requirements and/or points values, into classes of grades.

6.2 Merit Rating

6.2.1 Merit Rating

The systematic assessment of the behaviour and/or ability of workers in their work.

6.2.2 Merit Rate

The wage increment for a worker's merit.

6.2.3 Merit Factors

Worker characteristics selected as a basis for *merit rating* according to the nature of the work (for example, quality or quantity of work, dependability, adaptability, *job knowledge*, attitude, and *team-work*).

6.2.4 Merit Factor Scale

The division of a *merit factor* into progressive degrees of *merit*, for example, in its simplest form quality of work — poor, fair, average, good, very good, excellent. Alternatively *degrees of merit* may be expressed numerically.

6.2.5 Degrees of Merit

A defined and described level or stage on the *merit factor scale*.

6.2.6 Merit Value

A combination of the numerical values corresponding to the *degrees of merit* awarded to an individual worker.

6.2.7 Merit Grade

A group or class comprising workers whose *merit rating* falls within a defined range of *merit values*.

6.3 Incentives

6.3.1 Introduction

Many incentive schemes are based on measurement and standard of performance determined by *workstudy*. Hence, whilst it is not intended to deal with incentives in any comprehensive fashion, it is considered useful, in line with the main objects of this glossary, to include a number of terms used in connection with financial incentive schemes related to *work measurement*.

6.3.2 Incentive

A procedure designed to motivate a worker to achieve the desired level of performance.

6.3.3 Financial Incentive

An *incentive* which provides a financial reward related to the degree of success in achieving a desired objective.

6.3.3.1 Direct

A *financial incentive* which provides a financial reward specifically related to the worker's own degree of success in achieving a specified objective.

6.3.3.2 Indirect

A *financial incentive* which provides a financial reward not specifically related to the worker's success in achieving a specified objective, for example, based on the results of other workers or on factors only partially within his control.

6.3.4 Payment by Results

A *financial incentive* in which the worker's earnings are related to the work done and to other factors within the control of the individual or the team or group to which he belongs.

6.3.5 Work Measured Incentive

Payment by results based on *work measurement* data.

6.3.6 Target Time Output

A time (output) based on expected performance.

6.3.7 Unit Hour

The performance of worker, team or group of workers expressed in terms of *units of work* produced per hour.

6.3.8 Total Credits (Total Points)

The sum in minutes or hours of all allowed time earned plus any allowances.

6.3.9 Bonus Credit (*Bonus Credit Minutes/Hours, Time Saved Credits/Minutes/Hours, Bonus Minutes/Hours*)

The balance of credits left after deducting the credits representing *attendance time* from *total credits*.

6.3.10 Paise per Bonus Credits (*Bonus Rate*)

The monetary award in paise which the operator earns for each *bonus credit* obtained.

6.3.11 Hourly Earnings (*Earned Rate*)

The *gross wage* per attendance hour.

6.3.12 Bonus (*Incentive Earnings, Premium*)

The extra payment derived from a *financial incentive* scheme.

6.3.13 Bonus Starting Performance (*Breakeven Performance, Threshold Performance*)

Performance at which *bonus* begins (see Fig. 4).

6.3.14 Job Rate Performance

The performance at which an enhanced wage rate comes into operation.

6.3.15 Pay Performance (*Pay Credit Hour*)

Performance representing the average level earned by a worker over the payment period.

6.3.16 Pay Performance Relationship (*Earnings Curve, Wage Curve*)

The manner in which earnings are coupled to performance achieved, usually shown in a table or a graph.

6.3.17 Individual Scheme

A *payment by results* scheme in which the worker is rewarded in relation to his or her own individual results.

6.3.18 Collective Scheme

A *payment by results* scheme where workers are rewarded collectively in relation to their total results.

6.3.18.1 Team scheme

A *payment by results* scheme where a small number of workers form a natural composite unit whose work is interdependent and which can for all practical purposes be treated as a separate unit within a large group.

6.3.18.2 Group scheme

A *payment by results* scheme where any number of workers are rewarded collectively in relation to

their total efforts, but where the work of individual members or teams may not directly and immediately affect the results of the group.

6.3.19 Piecework

A *payment by results* scheme where the rewards are based on a constant and specified price per unit or piece produced, regardless of time taken.

6.3.20 Differential Piecework

A *payment by results* scheme where the rewards are based on a price per unit or piece which is variable in a specified way in relation to the level of production.

6.3.21 Premium Bonus Scheme (*Time Saved Bonus*)

A *payment by results* scheme where the rewards are based on the time saved which is the difference between the *allowed time* and the time taken for the task. Payment may or may not be directly proportional to results.

6.3.22 Standard Time Scheme (*Standard Time System*)

A *payment by results* scheme where rewards are based on a rate of payment per *unit of work* produced, expressed in terms of time.

6.3.23 Multi-factor Scheme

A *payment by results* scheme where rewards are based on more than one factor, for example, quality, machine utilization, process yield, output, etc.

6.3.24 Straight Proportional Scheme

A *payment by results* scheme where earnings are directly proportional to the results achieved, subject to meeting a *bonus starting performance* (see Fig. 4A). Earnings in the context may exclude over-time premium payments, shift allowance, etc.

6.3.25 Geared Scheme

A *payment by results* scheme where the rate of change of *bonus* is constant, and the *bonus* follows a straight line which, if extended below the *bonus starting performance*, would not give zero pay at zero performance (see Fig. 4B).

6.3.26 Stabilized Scheme

A form of *geared scheme* where the rate of change of *bonus* is constant, and the *bonus* follows a straight line which, if extended below the *bonus starting performance*, would give some pay at zero performance (see Fig. 4B).

6.3.27 Gearing

The relationship between the results achieved and *bonus* when this is not directly proportional.

6.3.28 Stabilizer

An *element* in a formula which reduces the fluctuations in *bonus* arising from variations inherent in the conditions under which the work is done.

6.3.29 Progressive Scheme (Accelerating Premium System, Accelerating Premium Bonus Plan, More than Straight Proportional Scheme)

A *payment by results* scheme where the rate of change in earnings rises as the results achieved rise (see Fig. 4C). Earnings in this context may exclude overtime premium payments, shift allowances, etc.

6.3.30 Regressive Scheme (Decelerating Premium System, Decelerating Premium Bonus Plan, Less than Straight Proportional Scheme)

A *payment by results* scheme where the rate of change in earnings falls as the results achieved rise (see Fig. 4C). Earnings in this context may exclude overtime premium payments, shift allowances, etc.

6.3.31 Differential Bonus Scheme (Differential Premium Bonus Scheme, Variable Payment by Results Scheme, Stepped Bonus Scheme)

A *payment by results* scheme which is combination of two or more schemes — *straight proportional*, *progressive*, *regressive* and/or *geared* — changing from one type of scheme to another at specified levels of performance.

6.3.32 Measured Day-Work Scheme

A *payment by results* scheme where a fixed *bonus* is paid for achieving any performance at or above a predetermined level.

6.3.33 Graded Performance Scheme

A *payment by results* scheme comprising a series of *bonus* grades, related to specified bands of performance. Operatives are paid a *bonus* rate dependent upon their past performance, averaged over an extended period of time, for example, several weeks or months.

6.3.34 Ceiling Bonus

The maximum level of *bonus* paid irrespective of results achieved.

6.3.35 Fall Back Level

A level of guaranteed minimum wage irrespective of performance rate (see Fig. 4).

6.4 Labour Control (see Fig. 2).**6.4.1 Working Day/Week**

The normal daily or weekly hours as agreed in the local situation or within the industry and beyond which *overtime* rates of wages may be payable.

6.4.2 Overtime

The part of *attendance time* which is spent by a worker at the place or places of employment in excess of or outside the normal *working day* or *week*.

6.4.3 Absence Time

Any period when a worker is absent from work during the normal *working day* or *week*.

6.4.4 Attendance Time (Clock Hours/Minutes)

The total time spent by a worker at the place or places of employment, whether working or available for work, for which payment is made.

6.4.5 Diverted Time (Lost Time)

The part of *attendance time* when a worker is engaged on other than *productive* or *ancillary work*, such as committee work, accidents, etc.

6.4.6 Waiting Time

The part of *attendance time*, other than *unoccupied time*, during which the worker is available but is prevented from working. Waiting time may be analyzed under the headings Department Responsible (DR) and Department Not Responsible (DNR) (see Fig. 2).

NOTE — Term 5.3.20 is repeated here since it is applicable to this section also and assists in appreciation of the other terms in this section.

6.4.7 Working Time

Time taken to do the work, including authorized relaxation.

6.4.8 Unoccupied Time (Unoccupied Cycle Time)

The periods during *machine* (or *process*) *controlled time* when a worker is neither engaged on *inside work* nor in taking authorized rest, the time for carrying out the *inside work* being calculated at a defined performance (usually *standard performance*) (see Fig. 2). Similar circumstances arise in *team work* where the availability of work to some workers is dependent on other members of the team.

NOTE — Term 5.3.19 is repeated here since it is applicable to this section also and assists in appreciation of the other terms in this section.

6.4.9 Controlled Work

Work for which standards have been set as a basis for control, that is control standards. It includes:

- a) Measured work,
- b) Estimated work, and
- c) Allocated work.

6.4.10 Uncontrolled Work

Work for which no control standards have been determined.

6.4.11 Measured Work

Work for which control standards have been determined by *work measurement* techniques (see 5.1.1 to 5.1.4).

6.4.12 Estimated Work

Work for which control standards have been assessed from practical experience.

6.4.13 Allocated Work

Work for which control standards have been set by allocating a number of workers or working hours to support various levels of output. The work content of the work may not have been accurately determined.

6.4.14 Productive Work

Work which alters the physical or chemical nature of the product or advances the process as a necessary contribution to its completion.

6.4.15 Ancillary Work

Service or any other work related to a process which is not appropriate to be classified as productive.

6.4.16 Excess Work

Extra work occasioned by departure from the specified method or materials for which control standards have been established.

6.4.17 Make-Up

The amount of adjustment in terms of money or time required to bring a worker's earnings up to his guaranteed minimum.

6.4.18 Operator Performance (True Performance)

An indication of the effectiveness of a worker or group of workers whilst on *measured* or *estimated* work :

Ratio of : Total *standard time* for all *measured* and *estimated* work
to : Time on *measured* and *estimated* work (excluding *diverted* and *waiting* time).

6.4.19 Department Performance

An indication of the effectiveness of a department or section:

Ratio of : Total *standard times* for *measured* and *estimated* work
to : Time on *measured* and *estimated* work plus any *waiting* or *diverted* time for which the department is responsible

} × 100

Alternatively:

Ratio of : Total *standard times* for *measured* and *estimated* work plus *uncontrolled* work at assessed performance
to : Total *attendance time* excluding time on *allocated* work, if any, and *waiting* or *diverted* time for which the department is not responsible

} × 100

6.4.20 Overall Performance

An indication of the net utilization of labour in producing useful output:

Ratio of : Total *productive standard times* for *measured* and *estimated* work plus *productive uncontrolled* work at assessed performance
to : Total *attendance time* excluding time on *allocated* work

} × 100

6.4.21 Bonus Index

The ratio of earnings under incentive conditions to equivalent earnings on time work (excluding *overtime premium*, shift allowances, etc, according to circumstances).

6.5 Plant and Machine Control

6.5.1 Plant and Machine Control

The procedure and means by which efficiency and utilization of units of plant and machinery are planned and checked.

6.5.2 Machine Capacity

The volume of output of a machine, usually expressed in physical units, capable of being produced in any convenient unit of time, for example, tonne per week and pieces per hour.

6.5.3 Machine Maximum Time (Machine Maximum Working Time)

The maximum possible time which a machine or group of machines could work within a given

period, for example, 168 h in one week or 24 h in one day (see Fig. 3).

6.5.4 Machine Available Time

The time which a machine could work, based on attendance time, that is, *working day or week plus overtime* (see Fig. 3).

6.5.5 Machine Down Time

The time during which a machine cannot be operated on production or *ancillary work* owing to breakdown, maintenance requirements, or for other similar reasons. In some cases, for example, preventive maintenance schemes, machine down time may form part of the time when the machine is 'not worked' (see Fig. 3).

NOTE — Term 5.3.23 is repeated here since it is applicable to this section also and assists in appreciation of the other terms in this section.

6.5.6 Machine Idle Time

The time during which a machine is available for production or *ancillary work* but is not used owing to shortage of work, materials or workers, including the time that the plant is out of balance. In some cases of known shortage of work or material this idle time may be considered as part of the time when the machine is 'not worked' (see Fig. 3).

NOTE — Term 5.3.24 is repeated here since it is applicable to this section also and assists in appreciation of the other terms in this section.

6.5.7 Machine Running Time

The time during which a machine is actually operating, that is, the *machine available time less any machine down time, machine idle time and machine ancillary time* (see Fig. 3).

NOTE — Term 5.3.25 is repeated here since it is applicable to this section also and assists in appreciation of the other terms in this section.

6.5.8 Machine Ancillary Time

The time when a machine is temporarily out of productive use for activities which are inherent in its operation, for example, changeover, setting, cleaning, lubrication etc. In some cases where *machine ancillary time* is extensive and planned ahead this may be considered as part of the time when the machine is 'not worked' (see Fig. 3).

6.5.9 Machine Running Time at Standard

The running time that should be incurred in producing the output if the machine is working under optimum conditions (see Fig. 3).

6.5.10 Machine Utilization Index

Ratio of *machine running time to machine available time*:

6.5.11 Machine Efficiency Index

Ratio of *machine running time at standard to machine running time*.

6.5.12 Machine Effective Utilization Index

Ratio of *machine running time at standard to machine available time*.

6.6 Wages and Wage Payment

6.6.1 Wage Plan

A scale of remuneration upon which is based payment to workers for work or for attendance at work during each hour, day or week.

6.6.2 Basic Wage Rate

The fundamental component of a wage rate as used in industrial agreement.

6.6.3 Time Work Rate

The rate of payment based on *attendance time* comprising the *basic wage rate* with additions, such as cost of living *bonus* and usually expressed as a rate per hour, a rate per day or a rate per week.

6.6.4 Total Job Rate

The total rate of payment including *job* evaluated rate where applicable, but excluding *supplementary allowances* and *overtime premium*.

6.6.5 Supplementary Allowances

Payments over and above the total *job* rate for conditions which are not an integral part of the *job* (such as shift allowances), or in compensation for abnormal working.

6.6.6 Job Rate Differential

An established difference between the total *job* rate of one *job* and another.

6.6.7 Wage Scale Determination

The construction of a scale of wages reflecting the relative values of jobs.

6.6.8 Overtime Premium

The increment paid for time worked beyond the agreed normal working hours.

6.6.9 Lieu Bonus

A payment made to a worker who through particular circumstances is not given any opportunity of participating in an *incentive* scheme, or who, being on an *incentive* scheme, is prevented from earning *bonus* on a *job* by abnormal conditions.

6.6.10 Compensating Bonus

A temporary payment made to a worker in compensation for loss of earnings caused by establishing new methods or by undertaking special work.

6.6.11 Pay Week

A seven days' period, not necessarily the calendar week, used as the basis for the calculation of wages.

6.6.12 Lying Time (Lying on Time)

The period between the completion of the working week and the payment of wages.

6.6.13 Guaranteed Week

The minimum number of hours for which payment must be made whether the full number of hours have been worked or not. The guarantee applies only when certain agreed conditions are met.

6.6.14 Gross Wage

Total earnings for a period, including *bonuses*, *overtime*, and any special payments, before any deductions are made.

6.6.15 Net Wage

The total payment after all deductions have been made from the gross wage.

6.7 Miscellaneous

6.7.1 Productivity

Productivity is the measure of efficiency of utilization of resources. It can be quantitatively expressed as the ratio of the output in terms of the goods/services and the input in terms of the resources used.

6.7.2 Production Planning and Control

Procedures and means by which manufacturing programmes and plans are determined, information issued for their execution and data collected and recorded to coordinate and control manufacture in accordance with the plans.

6.7.3 Material Control

Procedures and means by which the correct quantity and quality of materials and components are made available to meet production plans.

6.7.4 Material Utilization Control

Procedures and means set up to ensure that materials provided for the production plans are used most effectively.

6.7.5 Quality Control

An effective system for integrating the quality maintenance and quality improvement efforts of the various groups in an organization so as to enable production and service at the most economical levels which allow for full consumer satisfaction.

6.7.6 Operational Research (OR)

The application of scientific principles and techniques to problems involving the operations of a system with a view to providing optimum solutions to the problems.

6.7.7 Cybernetics

The study of communication and control mechanisms in machines and living creatures.

6.7.8 Ergonomics

The application of human biological sciences in conjunction with engineering sciences to the worker and his working environment, so as to obtain maximum satisfaction for the worker which, at the same time, enhances productivity.

6.7.9 Organization and Methods (O and M)

A management service the object of which is to increase the administrative efficiency of an organization by improving procedures, methods and systems, communications and controls and organizational structure.

6.7.10 Value Analysis

The systematic techniques to analyse an existing item or cost area specifically for functions and then develop alternate ways of performing only the required functions at the lowest cost.

6.7.11 Project Network Analysis (Network Analysis)

A group of techniques for presenting information to assist the planning and controlling of projects. The information, usually represented by a network, includes the sequence and logical inter-relationships of all project activities. The group includes techniques for dealing with time, resource and costs.

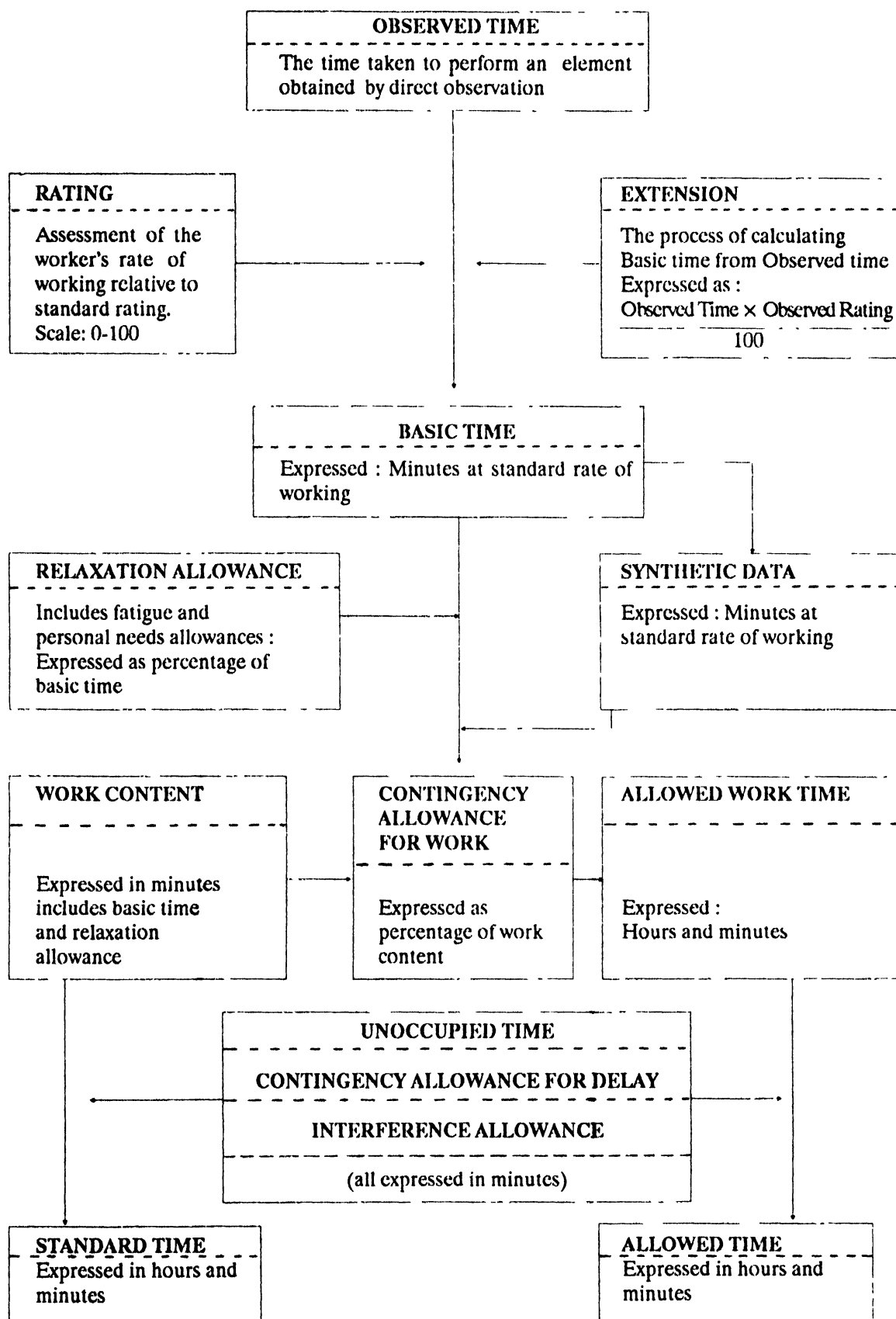


FIG. 1 MAKE-UP OF STANDARD AND ALLOWED TIME

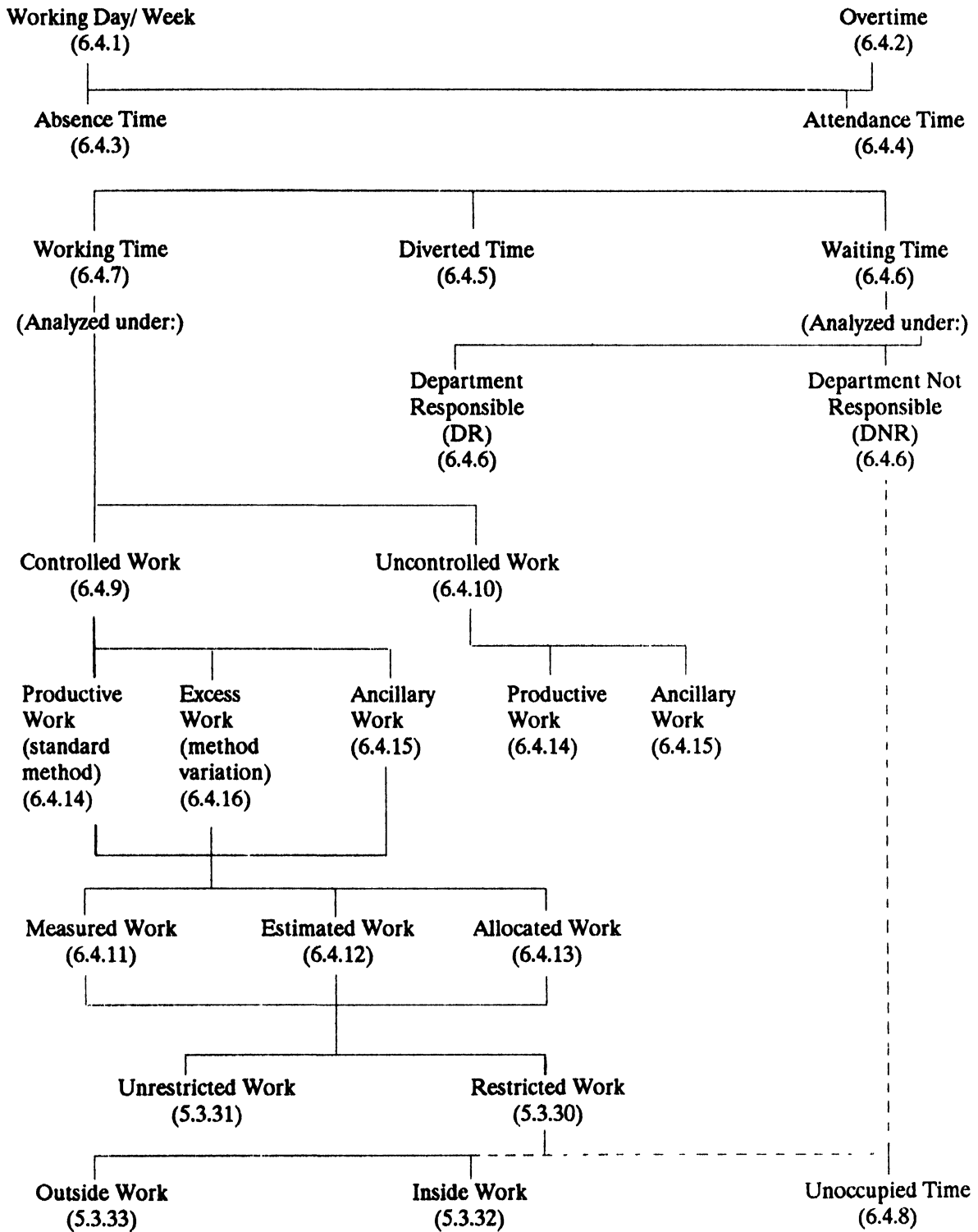


FIG. 2 EXPLANATORY DIAGRAM OF TERMS FOR LABOUR CONTROL

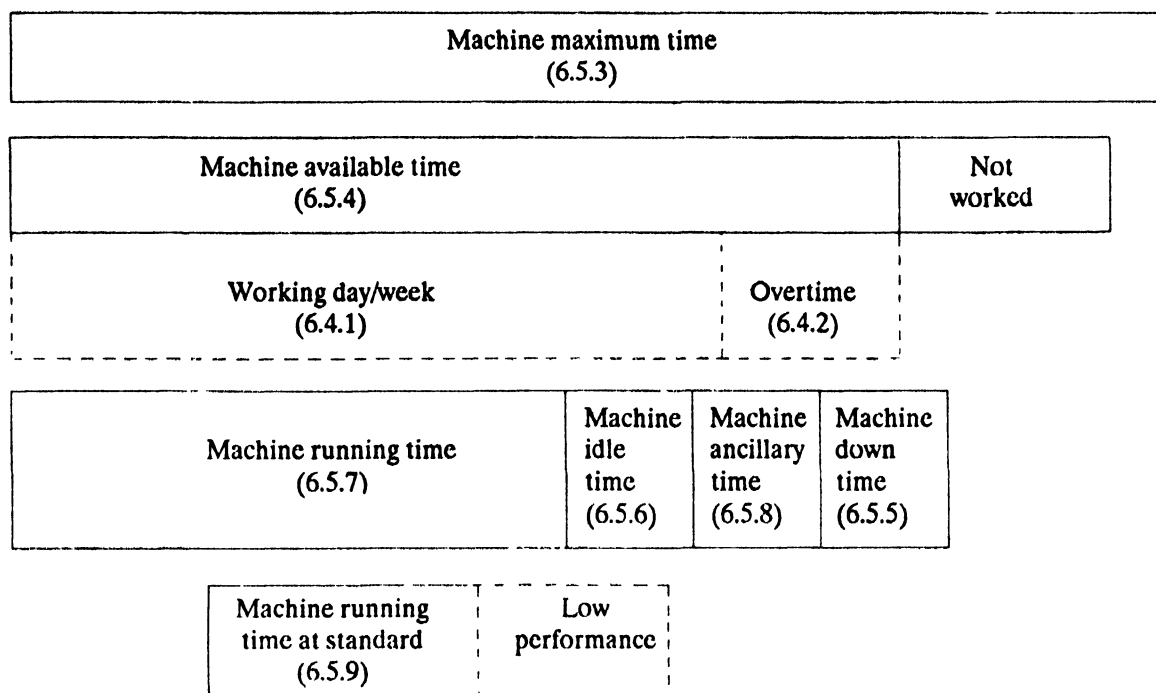
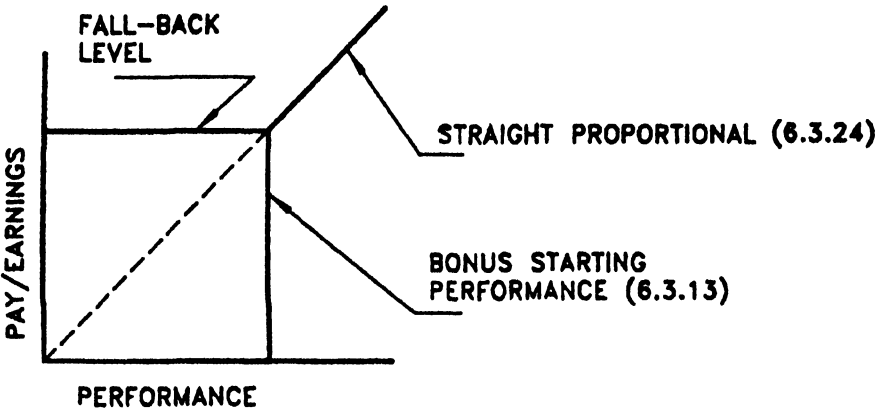
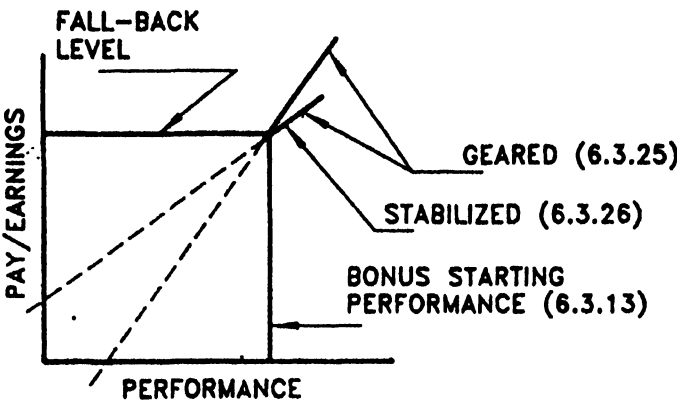


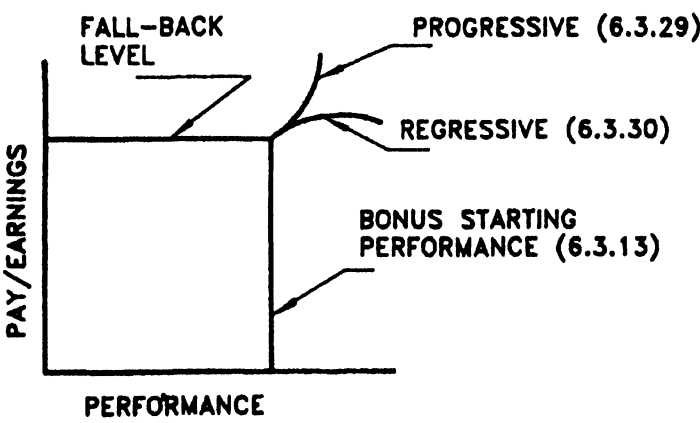
FIG. 3 EXPLANATORY DIAGRAM OF MACHINE TIME



4A



4B



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FIG. 4 GRAPHICAL REPRESENTATION OF MAIN FORMS OF PAYMENT BY RESULT SCHEMES

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ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Management and Productivity Sectional Committee, MSD 4

Chairman

Shri T. K. Gupta
3148, Sector D Pocket 3
Vasant Kunj, New Delhi 110070

Members

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SHRI D. I. SHRIVASTAVA (*Alternate*)
SHRI G. C. SOFAT
PROF R. K. SACHDEVA
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SHRI V. J. ANANTHARAMAN (*Alternate*)
CDR D. D. LOOMBA
DIRECTOR OF MANAGEMENT SERVICES (*Alternate*)
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SHRI A. K. TALWAR,
Director (MSD)

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Ordnance Factory Board, Pune
Central Building Research Institute, Roorkee
Indian Institute of Public Administration, New Delhi
Pieco Electronics and Electricals Limited (Philips), Mumbai
Larsen and Toubro Limited, Mumbai
Deputy Directorate General of Management Studies, Ministry of Defence,
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